

INTRAOCULAR LENS IMPLANT WITH TELESCOPE SUPPORT

FIELD OF THE INVENTION

The present invention relates generally to intraocular lens (IOL) implants and particularly to an intraocular lens implant with a telescope support.

BACKGROUND OF THE INVENTION

Intraocular inserts comprising telescopes are known. European Published Patent Application EP-A-212616 describes an intraocular lens that includes an anterior convex lens and a posterior concave lens. The contour of the lens can be selectively changed by varying the amount of fluid therein in order to change its refractive power. The lens is intended solely as a replacement for the natural lens of the eye.

U.S. Pat. No. 4,074,368 also describes an intraocular lens that includes an anterior convex lens and a posterior concave lens with high magnification proposed for the relief of conditions such as macular degeneration and diabetic retinopathy. The lens has many relatively low power lens surfaces arranged in a relatively long lens assembly which extends, when implanted, through almost the entire depth of the eye, from the pupil nearly to the retina. Implanting such a lens would necessitate major surgery. Moreover, the proposed lens does not provide a replacement for the natural lens for a wide field of view.

French Published Patent Application 2,666,735 describes an implant that includes a lens-shaped optical portion and a fastening assembly for securing the implant in the eye. The optical portion includes at least one closed internal cavity which contains a fluid or vacuum, forming a refraction chamber changing the optical properties of the lens.

Applicant/assignee's U.S. Pat. Nos. 5,354,335 and 5,391,202, the disclosures of which are incorporated herein by reference, describe intraocular inserts with a positive (converging) lens facing the anterior side of the eye and a negative (diverging) lens facing the posterior side, the two lenses forming a Galilean telescopic system. In U.S. Pat. No. 5,354,335, the lenses are assembled in a body member, the positive lens being generally flush with the anterior face of the body member. The negative lens may either be flush with the posterior face of the body member, or may project posteriorly therefrom. The body member anterior and/or posterior faces may be convex. In U.S. Pat. No. 5,391,202, the positive lens projects anteriorly from the anterior face of the body member which is preferably a soft lens constructed from a material such as a silicone.

In U.S. patent application Ser. No. 08/882,972, the disclosure of which is incorporated herein by reference, the present applicant/assignee discloses a further intraocular implant comprising a telescope body having an anterior end and a posterior end and including one or more windows sealed to the telescope body at the anterior end and/or the posterior end. There are at least two lenses disposed within the telescope body intermediate the anterior and posterior ends. The lenses may be a so-called reverse Galilean telescope, i.e., a negative lens faces the anterior side of the eye while a positive lens faces the posterior side of the eye. One of the features of the system is that the lenses are doublet lenses. The windows may be formed without optical power, or alternatively, may comprise a prism.

In U.S. patent application Ser. No. 08/882,973, the disclosure of which is incorporated herein by reference, the

present applicant/assignee discloses yet another intraocular implant comprising a telescope (either Galilean or reverse Galilean) which extends through at least a portion of a lens capsule of the eye and forwardly thereof toward the anterior side of the eye, the telescope not penetrating the vitreous of the eye. The intraocular lens implant is supported within the lens capsule by loops, in the absence of a lens within the lens capsule. One of the features of the system is that the telescope may be tilted such that light from outside the eye is focused by the telescope on a low resolution but operative section of the retina. Other optional features of the system include one or more lenses having a graded index of refraction, holographic (diffusing) lenses, and/or doublet lenses which help prevent chromatic aberrations. The patent application also discloses a method for manufacturing an intraocular insert telescope employing laser fusing to join the lenses to the telescope body. Alternatively or additionally, the method employs glass particles having a low temperature melting point as a joining medium.

SUMMARY OF THE INVENTION

The present invention seeks to provide an improved telescopic lens system extending from an IOL. In the present invention, a telescope body is supported by at least two carrying members placed at opposite ends of the telescope or at any other arbitrary positions along the telescope body. By supporting the telescope by more than one carrying member, any vibration or undesired displacement of the telescope is reduced or eliminated.

The term "carrying member" as used in the specification and claims is to be understood as any structure suitable for implantation in the eye and which is used to support the telescope in the eye. The carrying member of the present invention may or may not be a lens.

There is thus provided in accordance with a preferred embodiment of the present invention an intraocular lens (IOL) implant for implantation in an eye having a capsular bag, a posterior chamber and an anterior chamber, the implant including a first carrying member adapted to be attached to the capsular bag, and a telescope attached to and extending from the first carrying member, characterized by the telescope being further attached to at least one second carrying member, wherein the at least one second carrying member is adapted to be attached to a portion of the eye.

In accordance with a preferred embodiment of the present invention the first carrying member is attached to an end of the telescope and the at least one second carrying member is attached to an opposite end of the telescope. Alternatively the first carrying member is attached to an end of the telescope and the at least one second carrying member is attached to the telescope intermediate the end and an opposite end of the telescope.

Further in accordance with a preferred embodiment of the present invention the at least one second carrying member is adapted to be attached to a portion of the posterior chamber.

In accordance with an alternatively preferred embodiment of the present invention the telescope is adapted to extend through at least a portion of the capsular bag into the anterior chamber and the at least one second carrying member is adapted to be attached to a portion of the anterior chamber.

Preferably the first and the at least one second carrying members each include at least one haptic extending therefrom for attachment to a portion of the eye.

In accordance with a preferred embodiment of the present invention the first and the at least one second carrying members each have a bore formed therein and wherein the